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We claim:

1. An adhesive composition, comprising:  
at least one lignin component;  
5 at least one amine compound; and  
at least one boron compound.
2. The composition according to claim 1 wherein the lignin component is  
derived from decayed lignocellulosic material.  
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3. The composition according to claim 1 wherein the lignin component  
comprises an industrial lignin preparation.
4. The composition according to claim 1 wherein the composition is  
15 substantially formaldehyde-free.
5. The composition according to claim 1 wherein the composition  
comprises from about 0.1% to about 5% of at least one boron compound or plural boron  
compounds by weight of the lignin component.  
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6. The composition according to claim 1 wherein the amine compound  
comprises a polyamine.
7. A substantially formaldehyde-free adhesive composition, comprising:  
25 solubilized decayed lignocellulosic material; and  
at least one polyamine.

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8. The composition according to claim 7 wherein the solubilized decayed lignocellulosic material is mixed with a boron compound to produce boron-modified solubilized decayed wood.

5 9. The composition according to claim 8 wherein the boron-modified solubilized decayed lignocellulosic material comprises a reaction product of sodium borohydride and solubilized decayed lignocellulosic material.

10 10. The composition according to claim 7 wherein the composition further comprises a borate.

11. The composition according to claim 7 wherein the polyamine comprises polyethyleneimine.

15 12. The composition according to claim 7 wherein the solubilized decayed lignocellulosic material comprises a lignin.

20 13. A method for making a lignocellulosic composite, comprising:  
contacting an adhesive composition according to claim 1 with at least a first lignocellulosic substrate; and  
bonding the first lignocellulosic substrate to at least a second lignocellulosic substrate.

25 14. The method according to claim 13 wherein the method comprises forming a pre-bonded assembly of the first lignocellulosic substrate, the adhesive composition, and the second lignocellulosic substrate; and heating the adhesive composition to at least about 100°C.

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15. The method according to claim 13 wherein the first and second lignocellulosic substrates comprise lignocellulosic particles, and the contacting comprises mixing the adhesive composition with the lignocellulosic particles to form a pre-bonded assembly.

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16. A method for making a lignocellulosic composite, comprising:  
contacting an adhesive composition according to claim 7 with at least a first lignocellulosic substrate; and

10 bonding the first lignocellulosic substrate to at least a second lignocellulosic substrate.

17. A lignocellulosic composite, comprising at least a first and a second lignocellulosic substrate, the first and second substrates being bonded together by an adhesive according to claim 1.

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18. A lignocellulosic composite, comprising at least a first and a second lignocellulosic substrate, the first and second substrates being bonded together by an adhesive according to claim 7.

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19. An adhesive composition comprising a batch of the following ingredients that includes:

solubilized decayed lignocellulosic material;  
at least one boron compound; and  
at least one polyamine.

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20. An adhesive composition comprising a batch of the following ingredients that includes:

solubilized decayed lignocellulosic material;

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at least one reducing agent; and  
at least one polyamine.

21. An adhesive composition produced by:  
5 mixing decayed lignocellulosic material with at least one boron compound; and  
contacting the resulting mixture with at least one polyamine.

22. An adhesive composition produced by:  
mixing decayed lignocellulosic material with at least one reducing agent; and  
10 contacting the resulting mixture with at least one polyamine.

23. The composition according to claim 2, wherein the decayed  
lignocellulosic material comprises decayed wood.

15 24. The composition according to claim 19, wherein the decayed  
lignocellulosic material comprises decayed wood.

25. An adhesive composition comprising:  
a mixture of at least one decayed lignocellulosic material and an alkaline  
20 aqueous solution; and  
at least one polyamine.

26. The composition according to claim 1, wherein the boron compound is  
selected from boric acid, a boron salt, a borate ester, or a mixture thereof.

25 27. The composition according to claim 1, wherein the lignin component  
comprises demethylated lignin.

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28. The composition according to claim 26, wherein the lignin component comprises demethylated lignin.

29. An adhesive composition comprising a batch of the following  
5 ingredients that includes:  
demethylated lignin;  
at least one boron compound; and  
at least one polyamine.

10 30. The adhesive composition according to claim 29, wherein the boron compound is selected from boric acid, a boron salt, a borate ester, or a mixture thereof, and the polyamine comprises polyethyleneimine.

15 31. A method for making a lignocellulosic composite, comprising:  
contacting an adhesive composition according to claim 29 with at least a first lignocellulosic substrate; and  
bonding the first lignocellulosic substrate to at least a second lignocellulosic substrate.

20 32. A lignocellulosic composite, comprising at least a first and a second lignocellulosic substrate, the first and second substrates being bonded together by an adhesive according to claim 29.